

WHAT IS CLAIMED IS:

1. A dumping station for use in a stock order filling system having a collection area, the dumping station comprising:

5 a bin having a receiving end adapted to receive articles and a discharge end, the bin having a dump mode, in which articles in the bin are discharged from the discharge end onto the collection area, and a pick mode, in which articles are retained in the bin, the bin being biased under force of gravity toward the dump mode;

10 a releasable latch positioned to retain the bin in the pick mode against the force of gravity, the latch being responsive to a release signal to release the bin; and

15 a controller operably coupled to the latch and having a processor programmed to generate the release signal to release the latch, wherein the bin automatically switches from the pick mode to the dump mode under the force of gravity thereby to discharge articles in the bin onto the collection area.

20 2. The dumping station of claim 1, in which the releasable latch comprises an electromagnet.

25 3. The dumping station of claim 1, in which the processor is programmed to assign pick orders to the dumping station.

4. The dumping station of claim 1, in which the collection areas comprises a conveyor, and the processor is programmed to generate the release signal as a selected area of the conveyor passes the dumping station.

25 5. The dumping station of claim 1, further comprising a status indicator attached to the bin near the receiving end, the status indicator being movable between an active position, to provide a visual indication that more articles are to be placed in the bin, and an inactive position, to provide a visual indication that no more articles are to be placed in the bin.

6. The dumping station of claim 1, further comprising a support shaft, wherein the bin is pivotally mounted on the support shaft, the bin having a center of gravity laterally offset from the support shaft so that the bin is biased to a dump position corresponding to the bin dump mode, the bin being rotatable to a pick position corresponding to the bin pick mode.

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7. The dumping station of claim 6, in which a weight is attached to the bin near the discharge end to laterally shift the center of gravity of the bin toward the discharge end.

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8. The dumping station of claim 6, further comprising a dump pedestal positioned to engage the bin in the dump position, and a pick pedestal positioned to engage the bin in the pick position, the pick pedestal carrying the releasable latch.

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9. The dumping station of claim 8, in which the dump pedestal is oriented to direct articles onto the collection area.

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10. The dumping station of claim 1, in which the bin includes:  
an inclined bottom wall so that the discharge end is positioned below the receiving end;

a rear flap pivotally attached to the bin and movable between a closed position, in which the rear flap closes off the receive end, and an open position, in which the rear flap is rotated away from the receive end;

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a front flap having a lower mass than the rear flap pivotally attached to the bin and movable between a closed position, in which the front flap closes off the discharge end and engages the releasable latch, and an open position, in which the front flap is rotated away from the discharge end; and

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a cable connecting the front flap to the rear flap so that the front flap is in the open position when the rear flap is in the closed position and the front flap is in the closed position when the rear flap is in the open position;

5 wherein the bin is in the pick mode when the rear flap is manually placed in the open position and the front flap is held in the closed position by the releasable latch against the force of gravity acting on the open rear flap, and is switched to the dump mode when the latch is released, thereby allowing the force of gravity to pull the rear flap to the closed position and the front flap to the open position.

10 11. The dumping station of claim 1, in which the bin includes a hinged bottom wall movable between a closed position, in which the bottom wall closes off the bin discharge end and is held in place by the releasable latch against the force of gravity, and an open position, in which the bottom wall is rotated away from the discharge end, wherein the bin is in the pick mode when the bottom wall is manually placed in the closed position, and is switched to the dump mode when the latch is released, thereby allowing the force of gravity to pull the bottom wall to the open position.

15 12. The dumping station of claim 11, in which the bottom wall is inclined and the receive end is formed at a rear face of the bin.

20 13. The dumping station of claim 11, in which the bottom wall is substantially horizontal and the receive end is formed at a top face of the bin.

14. The dumping station of claim 1, in which the bin is manually placed in the pick mode.

25 15. A dumping station for use in a stock order filling system having a collection area, the dumping station depositing articles onto the collection area, the dumping station comprising:

a support;

30 a bin pivotally mounted on the support and having a receiving end, a discharge end, and a center of gravity laterally offset from the support to bias the bin under force of gravity toward a dump position, in which the discharge end is proximal to the collection area and articles placed in the bin move toward the discharge end;

a releasable latch positioned to hold the bin against the force of gravity when manually placed in a pick position, in which articles placed in the bin remain in the article receiving end of the bin, the latch being releasable to allow the bin to pivot back toward the dump position, the latch being responsive to a release signal to release the bin; and

5 a controller operably coupled to the latch and having a processor programmed to generate the release signal to release the latch, wherein the bin automatically moves from the pick position to the dump position under the force of gravity thereby to discharge articles in the bin onto the collection area.

10 16. The dumping station of claim 15, in which the releasable latch comprises an electromagnet.

15 17. The dumping station of claim 15, further comprising a dump pedestal positioned to engage the bin discharge end in the dump position, and a pick pedestal positioned to engage the bin in the pick position, wherein the pick pedestal carries the releasable latch.

20 18. The dumping station of claim 17, in which the dumping pedestal is oriented to direct articles onto the collection area.

19. The dumping station of claim 15, in which the processor is programmed to assign pick orders to the dumping station.

25 20. The dumping station of claim 15, in which the collection areas comprises a conveyor, and the processor is programmed to generate the release signal as a selected area of the conveyor passes the dumping station.

21. The dumping station of claim 15, in which the support is positioned below the bin.

22. The dumping station of claim 15, in which a weight is attached to the bin near the discharge end to laterally shift the center of gravity of the bin toward the discharge end.

5 23. The dumping station of claim 15, further comprising a status indicator attached to the bin near the receiving end, the status indicator being manually movable between an active position, to provide a visual indication that more articles are to be placed in the bin, and an inactive position, to provide a visual indication that no more articles are to be placed in the bin.

10 24. A method of operating a dump station for use in a stock order filling station having a collection area, the dump station having a bin with a receiving end adapted to receive articles and a discharge end, the bin having a dump mode, in which articles in the bin are discharged from the discharge end onto the collection area, and a pick mode, in which articles are retained in the bin, the bin being biased under force of gravity toward the dump mode, the method comprising:

manually placing the bin in the pick mode;

latching the bin in the pick mode;

placing articles into the bin;

20 releasing the latch in response to a release signal so that the bin automatically moves to the dump mode under the force of gravity, thereby to deposit the articles onto the collection area.

25 25. The method of claim 24, in which an electromagnet is used to latch the bin in the pick mode, the electromagnet being responsive to the release signal to release the bin.

26. The method of claim 24, in which the collection area comprises a conveyor.

27. A dumping station for use in a stock order filling system having a collection area, the dumping station depositing articles onto the collection area, the dumping station comprising:

5 a bin having a receiving end adapted to receive articles and a discharge end, the bin having a dump mode, in which articles in the bin are discharged from the discharge end onto the collection area, and a pick mode, in which articles are retained in the bin, the bin being biased under force of gravity toward the dump mode and manually placeable into the pick mode; and

10 a status indicator attached to the bin near the receiving end, the status indicator being manually movable between an active position, to provide a visual indication that more articles are to be placed in the bin, and an inactive position, to provide a visual indication that no more articles are to be placed in the bin.

15 28. The dumping station of claim 27, in which the status indicator comprises a lid, the lid overlying at least a portion of the receiving end when in the inactive position, and the lid being rotated away from the receiving end when in the active position.

20 29. The dumping station of claim 27, in which the status indicator is manually placed in the active position when the bin is in the pick mode.

30. The dumping station of claim 27, in which the status indicator is manually placed in the inactive position once the articles are placed in the bin.

25 31. The dumping station of claim 27, in which the bin is pivotally mounted on a support shaft for movement between a dump position, corresponding to the dump mode, and a pick position, corresponding to the pick mode, the bin having a center of gravity that is laterally offset with respect to the support shaft to bias the bin toward the dump position under the force of gravity.

30 32. The dumping station of claim 31, in which the status indicator, in the active position, shifts the bin center of gravity toward the receiving end to assist holding the bin

in the pick position, and in which the status indicator, in the inactive position, shifts the bin center of gravity toward the discharge end to assist movement of the bin toward the dump position.

5           33. The dumping station of claim 27, in which the bin includes a hinged bottom wall defining the discharge end, the bottom wall being movable between a closed position, in which the bottom wall closes off the bin discharge end and is held in place by the releasable latch against the force of gravity, and an open position, in which the bottom wall is rotated away from the discharge end, wherein the bin is in the pick mode when the bottom wall is manually placed in the closed position, and is switched to the dump mode when the latch is released, thereby allowing the force of gravity to pull the bottom wall to the open position.

10           34. The dumping station of claim 33, in which the status indicator comprises a handle pivotally attached to the bottom wall, wherein the handle is extended beyond a periphery of the bottom wall in the active position, and is retracted to overlie the bottom wall in the inactive position.

15           35. A method of filling stock orders using a plurality of dumping stations, each dumping station having a bin switchable between pick and dump modes, and a status indicator attached to the bin and movable between active and inactive positions, the method comprising:

20           placing the status indicator of a selected bin in the active position when the selected bin is in the pick mode to provide a visual indication that the selected bin is active;

25           placing articles into the selected bin; and

30           moving the status indicator of the selected bin to the inactive position after a last article has been placed in the selected bin to provide a visual indication that the selected bin is inactive.

36. The method of claim 35, in which the status indicator is manually placed in the open and closed positions.

5 37. The method of claim 35, in which the bin is pivotally mounted on a support and has a center of gravity that is laterally offset with respect to the support to bias the bin toward a dump position, corresponding to the dump mode, under the force of gravity.

10 38. The dumping station of claim 37, in which the status indicator, in the active position, shifts the bin center of gravity toward the receive end to assist holding the bin in a pick position corresponding to the pick mode, and in which the status indicator, in the inactive position, shifts the bin center of gravity toward the discharge end to assist movement of the bin toward the dump position.